AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (Currently Amended) A microfluidic system comprising:

- a printed circuit board comprising a polymer support layer (circuit board material), at least one surface of the support layer being provided with an electrically conductive layer including a plurality of electrodes, and the ~~said~~ electrically conductive layer is provided with one or more resistor polymer layer(s) based on acryl, epoxy resin, phenolic resin, silicon resin or fluorinated polymer, said layer(s) being adapted to be patterned by photolithography or an electron beam while leaving at least one of said electrodes exposed, and

- one or more microchannel material layer(s) with an outer surface provided with recesses forming ~~said~~ microchannels,

- the material layer comprising PDMS (Polydimethylsiloxane~~, SYLGARD®, DOW Corning~~), other organic siloxanes, including their polymerization products, silicones, polyacrylates (e.g. PMMA) and/or elastomeres with functional groups containing oxygen and/or nitrogen (e.g. polysulphone, polycarbonate and/or polyacrylonitrile),

- the recessed outer surface of the microchannel material layer contacting the photoresist layer of the printed circuit board such that at least one of the ~~said~~ electrodes is aligned with one of the ~~said~~ recesses, and

- the outer surface of the material layer being fluid-tightly connected with the resistor polymer layer of the printed circuit board.

2. (Currently Amended) The microfluidic system of claim 1, wherein the photoresist layer comprises SU-8 ~~the~~ epoxy resin ~~SU-8® (MicroChem Corp.)~~, bisbenzocyclobutene ~~(Cyclotene®, DOW)~~ or ~~CYTOP® (C~~cyclic [T]transparent [O]optical [P]polymer~~, Asahi Glass Company)~~.

3. (Currently Amended) The microfluidic system of claim 1 ~~or 2~~, wherein ~~the~~ a forming of a fluid-tight connection between the outer ~~side~~ surface of the microchannel material layer and the resistor polymer layer ~~may advantageously be~~ is assisted by plasma treatment.

4. (Currently Amended) The microfluidic system of ~~one of~~ claim[s] 1 ~~to 3~~, wherein the printed circuit board has at least one of its two sides provided with an electrically conductive multilayer layer structure comprising a plurality of electrically conductive layers electrically insulated from each other, the topmost of these layers comprising the electrode.

5. (Currently Amended) The microfluidic system of ~~one of~~ claim[s] 1 ~~to 4~~, wherein the printed circuit board is advantageously provided with a single or multilayer electrically conductive layer on each of its two sides and has via openings for the electrical connection of the electrically conductive layers.

6. (Currently Amended) The microfluidic system of ~~one of~~ claim[s] 1 ~~to 5~~, wherein the printed circuit board comprises at least one fluid channel for establishing the fluid communication of the microchannels, which fluid channel extends from the circuit board side connected with the microchannel material layer to the other, opposite side thereof.

7. (Currently Amended) The microfluidic system of ~~one of~~ claim[s] 1 ~~to 6~~, wherein the recesses forming the microchannels are formed in the polymeric support layer or in at least one of the polymeric support layers, the recesses preferably being formed by lithographic structuring.

8. (Currently Amended) A method for manufacturing a microfluidic system~~, in particular of one of the preceding claims~~, the method comprising the following steps:

- providing a printed circuit board comprising a polymeric support layer (circuit board material), at least one surface of the support layer being provided with an electrically conductive layer including a plurality of electrodes,

- depositing one or more resistor polymer layer(s) based on acryl, epoxy resin, phenolic resin, silicon resin or fluorinated polymer,

- structuring said resist or polymer layer(s) by photolithography or an electron beam to produce electrodes exposed in the ~~said~~ resist or polymer layer(s),

- providing one or more microchannel material layer(s) with a respective outer surface provided with recesses forming microchannels, and

- bonding the outer surface of each microchannel material layer with one of the resist or polymer layers on the printed circuit board for the fluid-tight connection of both, at least two electrodes being aligned with a respective one of the ~~said~~ recesses in the microchannel material layer(s).

9. (New) The microfluidic system of claim 2, wherein a forming of a fluid-tight connection between the outer surface of the microchannel material layer and the resistor polymer layer is assisted by plasma treatment.

10. (New) The microfluidic system of claim 2, wherein the printed circuit board has at least one of its two sides provided with an electrically conductive multilayer layer structure comprising a plurality of electrically conductive layers electrically insulated from each other, the topmost of these layers comprising the electrode.

11. (New) The microfluidic system of claim 3, wherein the printed circuit board has at least one of its two sides provided with an electrically conductive multilayer layer structure comprising a plurality of electrically conductive layers electrically insulated from each other, the topmost of these layers comprising the electrode.

12. (New) The microfluidic system of claim 2, wherein the printed circuit board is advantageously provided with a single or multilayer electrically conductive layer on each of its two sides and has via openings for the electrical connection of the electrically conductive layers.

13. (New) The microfluidic system of claim 3, wherein the printed circuit board is advantageously provided with a single or multilayer electrically conductive layer on each of its two sides and has via openings for the electrical connection of the electrically conductive layers.

14. (New) The microfluidic system of claim 4, wherein the printed circuit board is advantageously provided with a single or multilayer electrically conductive layer on each of its two sides and has via openings for the electrical connection of the electrically conductive layers.

15. (New) The microfluidic system of claim 2, wherein the printed circuit board comprises at least one fluid channel for establishing the fluid communication of the microchannels, which fluid channel extends from the circuit board side connected with the microchannel material layer to the other, opposite side thereof.

16. (New) The microfluidic system of claim 3, wherein the printed circuit board comprises at least one fluid channel for establishing the fluid communication of the microchannels, which fluid channel extends from the circuit board side connected with the microchannel material layer to the other, opposite side thereof.

17. (New) The microfluidic system of claim 4, wherein the printed circuit board comprises at least one fluid channel for establishing the fluid communication of the microchannels, which fluid channel extends from the circuit board side connected with the microchannel material layer to the other, opposite side thereof.

18. (New) The microfluidic system of claim 5, wherein the printed circuit board comprises at least one fluid channel for establishing the fluid communication of the microchannels, which fluid channel extends from the circuit board side connected with the microchannel material layer to the other, opposite side thereof.

19. (New) The microfluidic system of claim 2, wherein the recesses forming the microchannels are formed in the polymeric support layer or in at least one of the polymeric support layers, the recesses preferably being formed by lithographic structuring.

20. (New) The microfluidic system of claim 3, wherein the recesses forming the microchannels are formed in the polymeric support layer or in at least one of the polymeric support layers, the recesses preferably being formed by lithographic structuring.

21. (New) The microfluidic system of claim 4, wherein the recesses forming the microchannels are formed in the polymeric support layer or in at least one of the polymeric support layers, the recesses preferably being formed by lithographic structuring.

22. (New) The microfluidic system of claim 5, wherein the recesses forming the microchannels are formed in the polymeric support layer or in at least one of the polymeric support layers, the recesses preferably being formed by lithographic structuring.

23. (New) The microfluidic system of claim 6, wherein the recesses forming the microchannels are formed in the polymeric support layer or in at least one of the polymeric support layers, the recesses preferably being formed by lithographic structuring.